

*LEPECHINIA ROSSII* (LAMIACEAE), A NARROW ENDEMIC FROM THE WESTERN TRANSVERSE RANGES OF SOUTHERN CALIFORNIA

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ABSTRACT

*Lepechinia rossii* (Lamiaceae) is described as a new species narrowly endemic to the western Transverse Ranges of southern California. It is a member of section *Calycinae*, which includes four additional species endemic to California and adjacent Baja California, Mexico—*L. calycina*, *L. cardiophylla*, *L. fragrans*, *L. ganderi*—and *L. mexicana*, an anomalous, and probably unrelated, species from central Mexico. *Lepechinia rossii* is most readily distinguished from other members of section *Calycinae* by geniculate inflorescence axes, bent at 60–90° angles relative to the subtending stems, and by large, foliaceous inflorescence bracts which are generally equaling or exceeding their adjacent flowers in length, and little reduced distally. At present, two populations are documented, one in the Liebre Mountains (Los Angeles County) and one in the Topatopa Mountains (Ventura County), both occurring in chaparral, on public lands administered by the U.S. Forest Service. Conservation concerns include habitat degradation by off-highway vehicle activity, power line maintenance, petroleum exploration and extraction, and anthropogenic changes in fire frequency.

RESUMEN

*Lepechinia rossii* (Lamiaceae) es descrita como una nueva especie con endemismo limitado a la cadena Transverse Ranges (occidental) del Sur de California. Esta especie es un miembro de la sección *Calycinae*, la cual incluye cuatro especies adicionales endémicas a California y zonas adyacentes a California en Baja California, México—*L. calycina*, *L. cardiophylla*, *L. fragrans*, *L. ganderi*—y *L. mexicana*, anómalo y probablemente no relacionadas, especies de México central y sur-central. *Lepechinia rossii* es fácilmente diferenciado de los otros miembros de la sección *Calycinae* porque sus ejes de la inflorescencia son curvados en un ángulo de 60–90° con respecto al tallo y porque las brácteas de la inflorescencia son largas y foliáceas, las cuales son generalmente iguales o exceden en longitud a sus flores adyacentes y porque el tamaño de las brácteas a lo largo del eje de la inflorescencia apenas se reduce en longitud. En la actualidad, dos poblaciones son documentadas, una en la Liebre Mountains (Condado de Los Angeles) y la otra en la Topatopa Mountains (Condado de Ventura), ambas se encuentran en chaparrales, sobre terrenos públicos administrados por el Servicio Forestal de los Estados Unidos. Problemas de conservación incluye degradación del hábitat por actividad todoterrenos, mantenimiento de líneas de electricidad, exploración y extracción de petróleo, y cambios antropogénicos en la frecuencia de incendios.

Key Words: California, *Calycinae*, endemic, Lamiaceae, *Lepechinia*, Liebre Mountains, Topatopa Mountains, Transverse Ranges.

INTRODUCTION

*Lepechinia* Willd. (Lamiaceae) is a heterogeneous genus comprised of ca. 55 species of suffruticose perennials, shrubs, and small trees (Epling 1948; Mabberly 1997). Most taxa occur in the mountains of South America, with a few species extending into North America (Mexico, CA), and disjunctly, into the Pacific Ocean archipelagos of Revillagigedos (Mexico) and Hawai'i (Epling 1948). The most recent broad-scale floristic treatments for California (e.g., Munz 1959; Averett 1993), and southern California (Munz 1974), recognize four species of *Lepechinia* in the State. These include *L. calycina* (Benth.) Epling; *L. cardiophylla* Epling; *L. fragrans* (E. Greene) Epling; and *L. ganderi* Epling. The latter three taxa are found only in the southern third of the State, from the Trans-

verse Ranges and northern Channel Islands southward, with two (*L. cardiophylla*, *L. ganderi*) reaching adjacent northwestern Baja California, Mexico (Fig. 1A). All four taxa are placed by Epling (1948) within his section *Calycinae*, along with *L. mexicana* (S. Schauer) Epling from central Mexico. We describe here a fifth species of *Lepechinia* section *Calycinae* from California—*Lepechinia rossii* S. Boyd & O. Mistretta—based on collections made in the Liebre and Topatopa mountains, two units of southern California's western Transverse Ranges. Although the affinity of *L. rossii* with other Californian members of *Lepechinia* section *Calycinae* is evident in a number of variously shared morphological characters (e.g., habit, leaf shape, leaf vestiture, calyx shape, corolla size and shape)—Epling's "living mosaic" (1944)—it is a suite of inflorescence characters that most

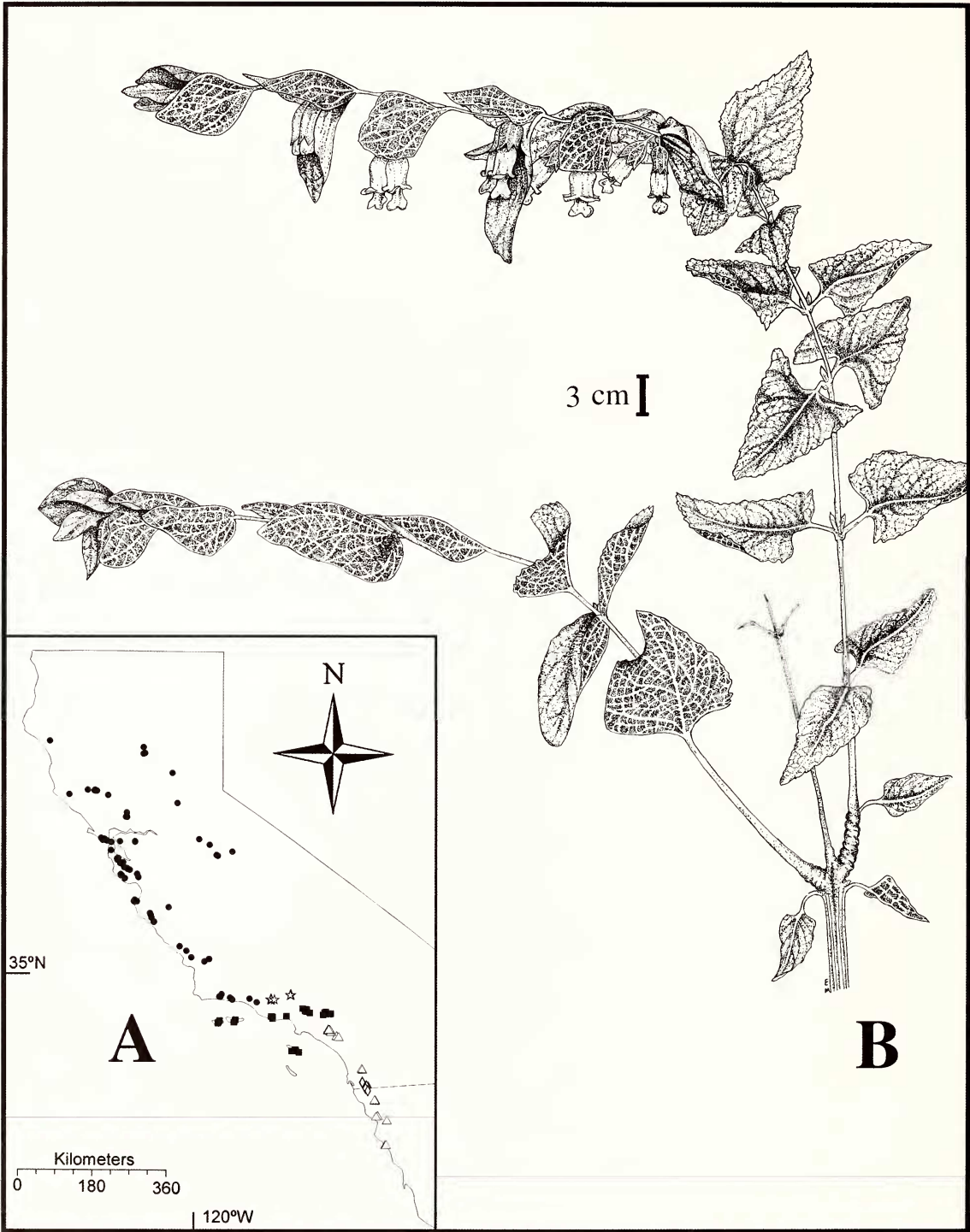


FIG. 1. *Lepechinia rossii*. A) map showing relative distribution of *Lepechinia* sect. *Calycinae* taxa in California and northern Baja California, Mexico. *Lepechinia rossii*—open stars; *L. calycina*—closed circles; *L. fragrans*—closed squares; *L. cardiophylla*—open triangles; *L. ganderi*—open diamonds. B) illustration of portion of an upper stem bearing two inflorescences, showing typical leaves, bent primary inflorescence axes, broadly ovate to suborbicular, overlapping floral bracts, and pendant flowers.

readily set *L. rossii* apart from all other members of the genus. These include orientation of the inflorescence axes, size, shape, and orientation of the floral bracts, and the degree to which these bracts are reduced apically.

Although two non-flowering, historical specimens of *Lepechinia* from the Topatopa Mountains, B.W. Evermann (Pine Creek near Sespe; 24 Mar 1917 [CAS #25345]), or R. Hoffmann (Sespe Canyon; 21 Mar 1927 [SBBG #6403; #6404]), are likely the earliest collections of this plant, from a practical standpoint *L. rossii* was "discovered" in the Fall of 1991. While conducting botanical surveys for the Angeles National Forest in late September of that year, the second author collected a sterile, partially deciduous *Lepechinia* on Red Mountain, between San Francisquito and Elizabeth Lake canyons, in the Liebre Mountains region of northwestern Los Angeles County. Upon seeing this specimen, Timothy S. Ross, then a senior curatorial assistant in the herbarium at Rancho Santa Ana Botanic Garden (RSA), immediately noted that *Lepechinia* was otherwise unknown in the Liebre Mountains, and the find was therefore of interest from a floristic standpoint. At the time, Ross speculated Mistretta's plant was likely *L. fragrans*, as that species is found in the San Gabriel and Santa Monica mountains, regions of the Transverse Ranges lying to the southeast and southwest of the Liebre Mountains, respectively.

In the spring of 1992, Ross and the first author visited the Red Mountain area and found a population of *Lepechinia* growing on the mountain's northern slope and upper ridgelines (ca. 500–1000 individuals). So distinctive were the plants in flower (geniculate inflorescence axes, with large, foliaceous, upwardly directed floral bracts, little reduced apically and generally longer than their adjacent flower) that it was instantly clear they were not *L. fragrans*, nor did they appear to fit any of the other Californian taxa in the genus. In Fall of 1995, while examining *Lepechinia* specimens from Santa Barbara Botanic Garden (SBBG), Ross encountered an E.R. Blakley collection from Tar Creek in the Topatopa Mountains (Ventura County; Los Padres National Forest), collected in 1994, that appeared consistent with the undescribed taxon from Red Mountain. Ross and the authors visited Blakley's Tar Creek site in Spring of 1995 and confirmed the Topatopa Mountains plants were the same undescribed entity as those of the Liebre Mountains. The Tar Creek site is ca. 40 km west of Red Mountain, and as a tributary of Sespe Canyon, in the general vicinity of the sterile 1917 and 1927 collections mentioned above.

In light of the central role our friend and colleague, Timothy S. Ross has played in the discovery and understanding of this new *Lepechinia*, it is our pleasure to name this species in his

honor. For the vernacular, we recommend the plant be called Ross' pitcher sage.

#### DESCRIPTION

***Lepechinia rossii*** S. Boyd & O. Mistretta, sp. nov. (Fig. 1B)—Type: USA, California, Los Angeles Co., Transverse Ranges, Liebre Mountains region: Head of Ruby Canyon on northern flank of Red Mountain, between Elizabeth Lake and San Francisquito canyons; 34°35'33"N, 118°29'29"W [NAD 27]; 305 m (1000 ft); 11 May 2004, S. Boyd & T. Morgan 11169 (holotype RSA; isotypes CAS, GH, SBBG, UC, UCR, US). Paratypes: USA, California, Los Angeles Co., Transverse Ranges; San Gabriel Mtns region: Red Mountain [technically Liebre Mountains]; 25 Sep 1991, O. Mistretta s.n. (RSA). Transverse Ranges; Liebre Mountains region: Ruby-Clearwater Truck Trail, south of Ruby Canyon, north of Red Mountain; near 34.59788°N, 118.52618°W [NAD 83] (Warm Springs Mountain 7.5 quad); T6N R16W sect. 24, SW¼ of NE¼; 788 m (2585 ft); 24 May 2005, L. Gross et al. 2311 (RSA). Ventura Co., Topa Topa [=Topatopa] Mountains, southern flank of Tar Creek, ca. 1 air mile southeast of confluence with Sespe Canyon, along an old dirt road leading down to Sespe Canyon off of Squaw Flat Road, about the base of hill "2582" at the boundary of the Sespe Condor Sanctuary; T5N R20W [sections] unsurveyed; ca. 732 m (2400 ft); 12 Jun 1996, S. Boyd et al. 8849 (RSA). Tar Creek, on edge of old road down to Green Cabins on Sespe Creek; 549 m (1800 ft); 12 Jun 1994, E.R. Blakley 7611 (SBBG).

Differt a *Lepechinia calycina*, *L. cardiophylla*, *L. fragrans*, et *L. ganderi* inflorescentia e basi 60–90° geniculatus et inflorescentiae bracteis foliaceis, plus minusve ultra flores.

Shrub, often forming clonal stands following disturbance or fire, generally less than 1.5 m tall with numerous ascending to erect branches from base and strongly aromatic herbage (Fig. 2); stems weak, ± brittle, those developing from short-shoots formed in upper axils of previous season's growth (vs. root or stem suckers) somewhat thickened towards base, with numerous, closely spaced leaf scars, growth of current season pale green, minutely glandular-puberulent with short-stipitate and sessile capitate-glandular trichomes (appearing ± papillate at 20 × magnification), and scattered multicellular, clear, kinked, irregularly branched, nonglandular trichomes (to 1.5 mm long), older branches with bark becoming reddish brown and shredding in age; leaves opposite, with petioles ca. 5–20 (–30) mm long, often slightly winged distally, blades bright, light green or yellowish green, ovate to deltate-ovate, ca. 3–13 cm long, truncate to subcordate at base, margins irregularly and



FIG. 2. Type plant of *Lepechinia rossii* growing in relatively open area surrounded by chaparral vegetation, showing typical rounded crown, geniculate inflorescence axes, and prominent, ascending bracts.

shallowly serrulate to dentate, upper (adaxial) surface shallowly bullate, lower (abaxial) surface with prominent, raised, reticulate venation, vestiture as on stems, and with scattered, golden, sessile, hemispherical glands set in shallow pits (especially below); *inflorescence* terminal on growth of current season, geniculate, bent  $\pm 60\text{--}90^\circ$  relative to subtending stem and thus arching or spreading, axis shallowly curved between nodes, appearing scalloped (Figs. 1B, 2; 3A), unbranched, or more often with two short branches arising at lowest node, especially on vigorous stems; *bracts* foliaceous (Figs. 1B, 3B), sessile, ascending, broadly ovate to suborbicular, 2.5–8 cm, generally longer than subtended flower and not strongly reduced in size distally, therefore appearing imbricate towards apex of inflorescence, margins entire or the lowest 2–4 pairs shallowly serrulate to dentate, surfaces  $\pm$  similar to leaves but less rugose adaxially, raised veins of abaxial surface visually prominent, and long multicellular hairs sparse or absent; *flowers* solitary in bract axils, pendent on minutely glandular-puberulent pedicels 12–13 mm long (Figs. 3B, 4A); *calyx* at anthesis  $\pm$  campanulate, the tube 10–12 mm long, finely raised-reticulate veined between 12–15 thicker longitudinal veins from base (Figs. 1B, 4B), minutely glandular-puberulent externally,  $\pm$  glabrous internally, the lobes generally erect or slightly spreading, broadly deltate, 4–6 mm long  $\times$  4–6 mm wide, the apex abruptly short apiculate, frequently one or more lobes with single, apiculate, deltate marginal

tooth 0.5–1.5 mm long  $\times$  0.5–1.5 mm wide, fruiting calyx enlarging, becoming somewhat inflated, papery; *corolla* overall broadly tubular (Figs. 1B, 3B, 4B), 33–39 mm long, abruptly narrowed in the proximal 8–9 mm, the point of narrowing marked internally by a ring of short, glandular hairs, broad portion of tube exerted from calyx ca. 15 mm, somewhat angled externally below point of stamen attachment, throat 10–11 mm wide, limb 5-lobed, strongly bilateral, the two lateral and two upper (adaxial) lobes short, 3.5–4.5 mm long  $\times$  4.5–6 mm wide, rounded apically, spreading to recurved, the lower (abaxial) lobe much larger, 10–12 mm long  $\times$  9–10 mm wide, deltate-ovate, erect,  $\pm$  downfolded longitudinally forming a slightly raised palate, apex entire to slightly emarginate, tube and limb glandular-puberulent externally, initially pale yellowish cream with small maroon spots (especially abaxially), sometimes lobes and throat also flushed with pale pinkish maroon, base-color quickly fading to off-white after limb is fully expanded, spots and flush becoming very pale or disappearing; *anthers* included within corolla tube, didynamous, filaments glabrous, free portion of long pair 8–9 mm, of short pair 4.5–5 mm, anther sacs divergent, lobes ca. 2 mm long; *style* including stigma 20–21 mm long, pale pinkish, stigma bilobed, sometimes protruding from buds before limb is fully expanded; *nutlets* 4, 3–3.5 mm diam.,  $\pm$  spherical, glossy black, appearing glabrous at 20 $\times$  magnification.



FIG. 3. *Lepechinia rossii*. A) detail of post-fruiting inflorescence axis showing shallow scalloping between nodes (marked by remnants of the pedicels). B) inflorescence at full anthesis showing relatively large foliaceous inflorescence bracts equaling or exceeding their adjacent flowers in length and only slightly reduced in size distally.

## DISCUSSION

### Relationships

As currently circumscribed, *Lepechinia* of California and northwestern Baja California, Mexico (*L. calycina*, *L. cardiophylla*, *L. fragrans*, and *L. ganderi*) are highly aromatic, weak-wooded shrubs (generally under 2 m tall), with deltate to oblong-ovate, drought-deciduous leaves, often subhastate or subcordate basally, and well developed, terminal inflorescences bearing relatively large, broadly tubular flowers that are solitary in axils of  $\pm$  foliose bracts (Averett 1993). All four of these taxa are members of Epling's (1948) section *Calycinae*.

As originally circumscribed, section *Calycinae* contained five species, the four above, and a fifth, *L. mexicana* (S. Schauer) Epling, a small, woody shrub found in xeric regions of central and south-central Mexico, including the states of Hidalgo, Oaxaca, Puebla, and San Luis Potosi (Epling 1948). *Lepechinia rossii* becomes the sixth member of the section, and the fifth species of the genus in California.

Species relationships among members of *Lepechinia* section *Calycinae* are complex. *Lepechinia mexicana*, however, is quite anomalous, both geographically and morphologically, with respect to the other members of section *Calycinae*, including *L. rossii*, and does not appear to be closely related to the Californian taxa (T.S. Ross



FIG. 4. *Lepechinia rossii*. A) detail of relatively large foliaceous inflorescence bracts equaling or exceeding their adjacent flowers in length, and bilateral corolla with much enlarged lower lip. B) closer view of flower showing campanulate calyx with broadly deltate, short apiculate lobes, fine, raised, reticulate veins between prominent rib-like veins, and corolla tube that is somewhat angled externally above point of stamen insertion (lower lip of corolla is projecting straight out from plane of picture).

personal communication). In addition to the great range disjunction between *L. mexicana* and the five Californian species, the former differs in its herbage being densely grayish stellate-canescens, a type of pubescence not seen among the Californian members of the genus. The leaves of *L. mexicana* have revolute margins,

and flowers are axillary along the stems, rather than being borne in terminal inflorescences subtended by highly modified bracts. The pedicels of *L. mexicana* bear two filiform bracts towards their base. The pedicels are bractless in the other five taxa. While it is likely *L. mexicana* is misplaced within section *Calycinae*, fully re-

solving that issue is beyond the scope of this paper. For the purposes of subsequent discussion, we have excluded *L. mexicana*.

Epling (1944) observed within California's *Lepechinia* a reticulate pattern of variously shared ranges (e.g., leaf shape, calyx tube shape, calyx lobe shape), which he believed were derived from repeated episodes of range expansion, contact among populations, hybridization, range contraction, isolation of populations, and ultimately, drift and selection. Certainly, *L. rossii* fits this pattern.

*Lepechinia rossii* is geographically intermediate between populations of *L. calycina* (further west in the Topatopa, Mount Pinos, and Santa Ynez mountains of Ventura and Santa Barbara counties) and *L. fragrans* (to the southeast in the San Gabriel Mountains, or southwest in the Santa Monica Mountains). A comparison of relative ranges of these species is presented in Figure 1A. Although geographically intermediate between *L. calycina* and *L. fragrans*, the morphological features of *L. rossii* do not necessarily reflect a cline between those two taxa. The cauline leaves of *L. rossii* are most similar to *L. cardiophylla*, and to a lesser extent, *L. fragrans*, in shape, and to *L. cardiophylla* and *L. calycina* in general vestiture. The shape of the calyx in *L. rossii*, especially the relatively short, broad lobes, is more like that of *L. calycina*, versus the relatively long calyx lobes found in *L. fragrans*. The general inflorescence architecture, as well as size, shape, and orientation of the floral bracts are wholly unlike any of the Californian taxa, and appear unique within the genus (Averett 1993; Epling 1944; 1948; Munz 1959; 1974; Wiggins 1980).

#### Distribution

At present, only two *L. rossii* populations are known, one in the Liebre Mountains and one in the Topatopa Mountains, separated by a distance of ca. 40 km (Fig. 1A). Both populations are of relatively limited areal extent, which may explain their relatively late discovery. On the other hand, portions of both known populations are easily visible from long-established U.S. Forest Service roads. As suggested above, the earliest documented collections of *L. rossii* are likely those of B.W. Evermann or R. Hoffmann. Unfortunately, these three specimens lack definitive mature inflorescences and flowers, therefore providing limited information as to their identity. Previously, the Evermann and Hoffmann specimens had been tentatively identified as *L. calycina*. Apparently, due to their sterile condition, these specimens garnered little attention from subsequent workers, including Epling. Affinity with *L. rossii* is based on general provenance, leaf vestiture, and in the case of the Hoffmann specimen (SBBG #6303), incipient inflorescence morphology.

Both Tar Creek and Pine Creek are tributaries of Sespe Creek, with their respective points of confluence with the main drainage separated by approximately 3.3 km. We believe the Evermann specimen was likely collected within a broader meta-population that includes the Tar Creek site. Although Hoffmann's locality information is so vague as to be anywhere within the Sespe drainage, we believe the specimen was taken within Sespe Canyon in the same general vicinity of Tar and Pine creeks.

*Lepechinia rossii* is the most narrowly distributed of the five Californian taxa, being endemic to the western Transverse Ranges (Fig. 1A). In contrast, *L. calycina* is the most widely distributed of the Californian taxa and is endemic to the state, ranging from southeastern Ventura County northward through the Coast Ranges to Lake County, eastward to Butte County, and southward through the foothills of the Sierra Nevada to Mariposa County (Averett 1993; Munz 1959, 1974; Smith 1998). *Lepechinia fragrans* is also endemic to the state, found on Santa Catalina (Los Angeles Co.), Santa Cruz, and Santa Rosa (Santa Barbara Co.) islands, and in disjunct occurrences on the mainland in the Santa Monica (Los Angeles and Ventura cos.) and San Gabriel (Los Angeles and San Bernardino cos.) mountains (Averett 1993; Junak et al. 1995; Munz 1959, 1974; Raven et al. 1986; Thorne 1967). *Lepechinia cardiophylla* is restricted to the Peninsular Ranges, found primarily in the northern Santa Ana Mountains (Orange and Riverside cos.), with small, widely disjunct populations to the south, in the coastal foothills of San Diego County and adjacent northwestern Baja California, Mexico (Averett 1993; Beauchamp 1986; Munz 1959, 1974; Lathrop and Thorne 1978; Wiggins 1980). *Lepechinia ganderi* is also restricted to the Peninsular Ranges, occurring in scattered populations in the higher coastal foothills of southwestern San Diego County and adjacent northwestern Baja California, Mexico (Averett 1993; Beauchamp 1986; Munz 1959, 1974; Wiggins 1980).

#### Habitat

Both the Red Mountain and Tar Creek populations of *L. rossii* occur within the Santa Clara River watershed, on lands managed by the U.S. Forest Service (Liebre Mountains, Angeles National Forest; Topatopa Mountains, Los Padres National Forest). In both areas, plants generally grow on north- to northeast-facing slopes, and on adjacent portions of ridgelines. There does not seem to be a strong geologic or edaphic factor involved in distribution of *L. rossii*. On Red Mountain, *L. rossii* is mainly associated with fine-grained, reddish, nonmarine sedimentary rock of Eocene or Paleocene age,

with outcrops of Precambrian gneiss and Mesozoic granitic rocks in the immediate vicinity (Jennings and Strand 1969). In the Tar Creek area, *L. rossii* is also associated with fine-grained, reddish substrate, but in this case marine sedimentary rocks of middle Miocene age, with outcrops of Oligocene volcanics in the general vicinity (Jennings and Strand 1969). Although the locality information on Evermann's 1917 collection of *L. rossii* is vague (Pine Creek near Sespe), geologic substrates in the area around Pine Creek and its confluence with Sespe Creek are dominated by middle Miocene volcanics, suggesting populations occur on this substrate as well. Hoffmann's 1927 collection has such vague locality information, that speculation on associated geologic substrate is unwarranted.

At both the Red Mountain and Tar Creek sites, *L. rossii* is associated with chaparral vegetation characterized by a mix of shrubs including *Adenostoma fasciculatum* Hook. & Arn., *Cercocarpus betuloides* Nutt. ex Torr. & A. Gray, *Clematis lasiantha* Nutt., *Eriodictyon crassifolium* Benth. var. *nigrescens* Brand, *Eriogonum fasciculatum* Benth. var. *foliolosum* (Nutt.) S. Stokes ex Abrams, *Eriophyllum confertiflorum* (DC.) A. Gray, *Fraxinus dipetala* Hook. & Arn., *Quercus berberidifolia* Liebm., *Heteromeles arbutifolia* (Lindl.) M. Roem., *Keckiella cordifolia* (Benth.) Straw, *Rhamnus ilicifolia* Kellogg, *Ribes malvaceum* Sm., and *Solanum xanti* A. Gray. As with other species of *Lepechinia* in California, *L. rossii* is generally associated with relatively open areas, often appearing in greatest abundance following wildland fire, or at least temporarily, in areas affected by anthropogenic disturbance, such as fuel breaks and road-cuts. Within mature stands of chaparral, *L. rossii* is largely limited to small natural openings, such as near bedrock outcrops, or within a gap where a larger shrub has died.

#### Conservation Status

Identifiable threats within the Liebre Mountains are largely limited to localized habitat disturbance by off-highway vehicle (OHV) activity, and maintenance of electric power line towers that cross the summit of Red Mountain. In the Topatopa Mountains, identifiable threats again include localized habitat disturbance by OHV activity, as well as grading of pads for petroleum exploration and potentially extraction. As a species associated with earlier phases of post-fire succession, of general concern is type-conversion of habitat due to invasion by weedy exotic grasses (e.g., *Bromus diandrus* Roth, *B. madritensis* L. subsp. *rubens* [L.] Husnot, *Vulpia myuros* [L.] C.C. Gmel.), and concomitant increase in fire frequency.

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